

ACTS Quarterly Article

A CTS Broadband Aeronautical Terminal Development Progresses

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As part of the ongoing effort to investigate commercial applications of ACTS technologies, NASA's Jet Propulsion Laboratory and various industry/government partners are developing a broadband mobile terminal for aeronautical applications. The ACTS Broadband Aeronautical Terminal is being designed and developed to explore the use of K/Ka-band for high data rate aeronautical satellite communications. Currently available commercial aeronautical satellite communications systems are only capable of achieving data rates on the order of tens of kilobits per second. The broadband terminal, used in conjunction with the ACTS mechanically steerable antenna, can achieve data rates of 384 kilobits per second, while use of an ACTS spot beam antenna with this terminal will allow up to 1.544 megabits per second. The aeronautical terminal will be utilized to test a variety of applications that require a high data rate communications link. Beyond these applications, it is thought that if a wideband communications pipe is made available, unforeseen applications will develop. The use of the K/Ka-band for wideband aeronautical communications has the advantages of spectrum availability and smaller antennas, while eliminating the one major drawback of this frequency band, rain attenuation, by flying above the clouds the majority of the time.

The experimental objectives with this terminal are to demonstrate broadband aeronautical communications, characterize the communications channel and terminal, and transfer this technology to industry to aid the development of a commercial system. The aeronautical terminal is currently undergoing development in preparation for experiments that will commence in July 1995. Of the aeronautical terminal subsystems, the modem, video codec, and RF electronics have been completed or are near completion. The aeronautical antenna and radome are being developed by IMS Technologies, inc. IMS recently completed the Critical Design Review and will deliver the antenna in mid 1995. The IMS antenna design utilizes a slotted waveguide array, is mechanically steered in both azimuth and elevation, and is designed to enable mounting on a variety of aircraft. The radome is hat shaped with a maximum height of 6.7' and a 27.6' diameter;

roughly the size of the SkyRadio radome currently flying on United Airlines and Delta Airlines aircraft.

The initial two experiments to be conducted with the aeronautical terminal are shown in the accompanying figures. Rockwell/Collins is working with NASA/JPL to develop the terminal and integrate it into a Rockwell Sabreliner aircraft to demonstrate the transmission of compressed video both to and from the aircraft. NASA Ames Research Center will be flying the terminal in the Kuiper Airborne Observatory to transmit imagery from the aircraft for an educational broadcast and to conduct remote tele-science. Beyond these two experiments, several additional experiments with industry and government partners are in various stages of planning.



